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Upper-middle and low socio-economic level (SEL) subjects were compared on a discrimination learning task and on personality measures of locus of control of reinforcement and need for approval (Napp). Upper-middle SEL subjects were found to be faster discrimination learners than low SEL subjects only when the relevant stimulus cue was on a highly attended stimulus dimension. No SEL differences occurred when training was on a cue of a low attention level dimension. As predicted, internal subjects learned the discrimination task faster than external subjects, but this relationship held only for the upper-middle SEL subjects and only after the correlation was corrected for the attentuating effects of the low reliability on the IE scale. No relationship between Napp and the learning task was found for either SEL. Low SEL girls were found to be more external and higher in Napp than low SEL boys and upper-middle SEL girls and boys. Results suggest that the attention level of the relevant dimension is a major variable in discrimination learning. Further investigation of the personality correlates of discrimination learning is also suggested. (Author)

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THE RELATIONSHIP OF INDIVIDUAL DIFFERENCE MEASURES TO SOCIO-ECONOMIC LEVEL AND TO DISCRIMINATION LEARNING[1]

by

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ABSTRACT

Upper-middle and low socio-economic level (SEL) Ss were compared on a discrimination learning task and on personality measures of locus of control of reinforcement and need for approval (Napp). Upper-middle SEL Ss were found to be faster discrimination learners than low SEL Ss only when the relevant stimulus cue was on a highly attended stimulus dimension. No SEL differences occurred when training was on a cue of a low attention level dimension. As predicted, internal Ss learned the discrimination task faster than external Ss, but this relationship held only for the upper-middle SEL Ss and only after the correlation was corrected for the attentuating effects of the low reliability on the IE scale. No relationship between Napp and the learning task was found for either SEL. Low SEL girls were found to be more external and higher in Napp than low SEL boys and upper-middle SEL girls and boys. Results suggest that the attention level of the relevant dimension is a major variable in discrimination learning.

Further investigation of the personality correlates of discrimination learning is also suggested.

INTRODUCTION

A number of investigators have suggested that low socio-economic level (SEL) children have inferior abstracting ability and inferior verbal and language abilities (Deutsch, M., 1964a, 1964b, 1965, 1966; Gordon, 1965; McCandless, 1952; Siller, 1957; Wellman and McCandless, 1946). Considering specific learning paradigms, at least two studies have demonstrated that higher SEL nursery and kindergarten Ss perform better on discrimination tasks than do lower SEL Ss (Covington, 1967; Olson, Bibelheimer, and Stevenson, 1967).

An important issue in discrimination experiments is the role of the attending or orienting response of the S. Zeaman and House (1963), working specifically with retardates, emphasized the role of attention in discrimination experiments and hypothesized "that retardates suffer from low initial probability of observing certain relevant dimensions rather than from poor ability to learn which of two observed cues is correct" (1963, p. 188). Thus when pairs of stimuli from two dimensions are presented together, it would be expected that learning should occur at a faster rate when the stimulus pair with the higher probability of being observed is the relevant or rewarded dimension.

Several experiments have demonstrated the importance of dimensional preference on learning tasks. For nursery and kindergarten children, Suchman and Trabasso (1966) found that concept learning was facilitated when the relevant training dimension was also the preferred dimension (either form or color) and that learning was slower when the preferred dimension was irrelevant. Likewise, Wolff (1966) found that training on the preferred dimension (brightness or size) resulted in faster learning than training on the non-preferred dimension for first grade Ss.

In addition to differences in speed of discrimination learning between the two SEL groups, differences in various personality measures have been noted between upper-middle and low SEL children. In 1963, Battle and Rotter reported that low SEL children were more likely to be external in locus of control than middle SEL children. This result has been supported by Shaw and Uhl (1969) who found that lower SEL second graders are more external than their upper-middle counterparts. That is, these children are more prone to look to outside sources for control and rewarding of their own behavior, rather than to see themselves as effective agents of mastery over what happens to them. Furthermore, Shaw and Uhl found that locus of control was related to success in reading for upper-middle SEL children, the more internal of whom were better readers. Other researchers have reported that internal children are more mature and show greater response to cues of success and failure than externals (Bialer, 1961), that sex is not a determiner of IE scores and that internal Ss (sixth and eighth graders) were more certain of success on a line-matching task measuring level of aspiration (Battle and Rotter, 1963).

Another personality variable of interest in the present study is the individual's need for approval (Napp) or his tendency to describe himself positively by answering selected questions in a "socially desirable" manner. Crandall and Crandall (1965) found that socially desirable responses were more characteristic of younger children (using third, fourth, fifth, sixth, eighth, tenth and twelfth graders), of dull children (as assessed by measures on the California Test of Mental Maturity and the Large-Thorndike), and of girls. They further found no relationship between Napp and social class, family size, or ordinal position. Other researchers (Crandall, Katkovsky, and Crandall, 1965; Crandall, 1966) have reported that high Napp children perform more poorly on standardized achievement tests, are less creative, and show lower success

expectancies in level of aspiration situations.

Of particular relevance to the present study are the recent findings of Crowne, Holland, and Conn (1968). These experimenters found that fifth and sixth grade Ss who scored high on Napp performed more poorly on a discrimination task than did low Napp Ss. They suggest that high Napp children are poorer learners because of the "effects of an anxious arousal on attention to the dimensional aspects of stimuli."

The present study was designed to test differences between low SEL and upper-middle SEL children on a discrimination task and to study the effect of using high and low attending stimulus pairs on the ease of solving the learning task. Furthermore, differences between the two SEL groups on measures of locus of control and Napp were studied as were the relationships of these two personality variables to discrimination learning performance.

On the basis of previous findings, the following predictions were made:

1. Low SEL Ss would perform more poorly than upper-middle SEL Ss regardless of the attention level of the rewarded stimulus cue.

2. For both SEL groups, rewarding the selection of a cue of the high attention stimulus pair would result in faster learning than rewarding a cue of a less attended stimulus pair.

3. Ss with low external scores (i.e., internal Ss) would learn the discrimination task faster than those with high external scores.

4. Ss with high Napp scores would learn the discrimination task slower than those with low Napp scores.

5. Low SEL Ss would have higher external scores than upper-middle SEL Ss.

6. There would be no difference between SEL groups on the measures of Napp.

METHOD

Subjects: For the discrimination experiment Ss were students from all the third grade classes of two Atlanta public schools, one school serving an area encompassing a very high concentration of white low income families. The other school serves a homogeneous group of people who are economically and educationally classified as white upper-middle class families. Analyses are based on 55 (30 males; 25 females) upper-middle SEL and 60 (40 males; 20 females) low SEL Ss. Scores on the California Short Form Test of Mental Maturity were available for most of the students in both schools. The mean score for the upper-middle SEL students was 121 with a standard deviation of 9.7; the mean for the low SEL students was 97 with a standard deviation of 15.8. All students were Caucasian and had performed satisfactorily on visual and auditory screening tests.

A year later, those students who were then fourth graders and who had participated in the discrimination task in these two schools were given the personality questionnaires. There were 42 (23 males and 19 females) upper-middle SEL Ss and 30 (18 males and 12 females) low SEL Ss.

Apparatus: Slides of the stimuli were projected onto a screen with a 35 mm slide projector. The experimental presentation was completely automated, and the same for all classes.

Ss recorded their answers in programmed testing boxes, which were originally designed for four answers per item but were modified to two choice answer boxes. The modified boxes were designed so that S punched either a left or a right hole for each item to indicate his choice of the left or right stimulus. This procedure provided immediate knowledge of whether the choice was correct or incorrect.

Stimuli: A highly attended stimulus pair of one dimension and a low attention stimulus pair from another dimension were determined three weeks prior

to the experimental task for both SEL groups. Found to be high in attention were a pair of 20° and 160° angles; the colors purple and blue served as the low attention stimulus pair. These two pairs had been found to be statistically different in preference for both SEL groups. The stimulus pairs were combined to make the four possible stimulus arrangements shown in Table 1. Forty-eight slides of these four arrangements, which were enclosed in two black circles, served as the experimental stimuli. The slides were arranged on the basis of a modified Gellerman (1933) series. Position was an irrelevant dimension, and all dimensions were mutually orthogonal.

Personality Instruments: The Bialer-Cromwell Children's Locus of Control Scale was used to assess internal versus external control of reinforcement. The test consists of 23 items which require a "yes" or "no" response. A "yes" answer is scored as internal control for some items, and a"no" item indicates internal control for others. The sum of the internal responses equals the internal control score; likewise, the sum of the external responses equals the external control score. Since the maximum score for either internal or external control is 23 and since internal and external scores are perfectly correlated with each other, only the external control score was used.

To measure Napp, Crandall's Children's Social Desirability Questionnaire (CSD) was used. This 48 item scale is answered by either "yes" or "no" responses, each response being scored as to whether it is the socially desirable one or not. The sum of the socially desirable responses gives the Napp score for the instrument.

Procedure: In both SEL groups, Ss were randomly assigned to two experimental groups. Half of each class was trained to respond to the 20° angle (a cue of the high-attention stimulus pair). The other half was trained to respond to the color purple (a cue of the low-attention stimulus pair).

TABLE 1

The four possible arrangements of high and low attention stimulus pairs and their positions.

	left configuration	right configuration
1.	purple 20°	blue 160°
2.	purple 160°	blue 20°
3.	blue 20°	purple 160°
4.	blue 160°	purple 20°

Each slide was presented for 15 seconds with the only intertrial interval being the time required for the apparatus to change slides. The Ss task throughout was to look at the two circles, choose one, and try to get as many correct as possible.

In group administration independently of and approximately a year after the discrimination task, all fourth grade students in both SEL schools were given the two personality questionnaires. The experimenter (E) read each item, and Ss circled either the yes or no answer beside each item.

RESULTS

The dependent variable for the discrimination task was the log of the number of trials required to reach a criterion of four consecutive correct trials. Ss who did not meet this criterion within the 48 training trials were assigned a score of 48. There were 10 such upper-middle SEL Ss (7 in the low attention group and 3 in the high attention group) and 14 such low SEL Ss (12 low and 2 highs). Statistical analyses are based on Ns of 55 upper-middle SEL Ss and 60 low SEL Ss.

Means and standard deviations for the two SEL groups and their corresponding attention levels are shown in Table 2. Data were analyzed using a 2 x 2 factorial analysis of co-variance for unequal sample sizes; and results are summarized in Table 3. IQ was used as a covariate since its correlation with the dependent variable was $r = -.19$.

The main effect of attention level was significant $[F\ (1,110) = 9.830,\ p < .01]$ with Ss trained on the high dimension learning the task faster than those trained on the low. SEL as a main effect was not significant $[F\ (1,110) = 2.565,\ NS]$; however, the interaction between SEL and attention level was significant $[F\ (1,110) = 5.434,\ p < .05]$

TABLE 2

Means and sd's of log number of trials
required to reach criterion on the learning task

		high attention level	low attention level
upper-middle SEL	mean	.8478	1.2724
	sd	.4613	.3814
	n	29	26
low SEL	mean	1.2208	1.2771
	sd	.3244	.4677
	n	29	31

TABLE 3

Summary table for the 2x2 analysis of covariance
for the discrimination data

Source of variance	SS	df	MS	F
A (SEL)	0.4434	1	0.4434	2.565
B (attention level)	1.6996	1	1.6996	9.830**
AB	0.9394	1	0.9394	5.434*
Error	19.0184	110	0.1729	

*significant at the .05 level

**significant at the .01 level

Two t tests to compare the means of the two attention level groups within each SEL indicated that for upper-middle SEL Ss, the group trained on the high attention pair reached criterion in fewer trials than the group trained on the low attention pair [t (53 df) = 3.629, p < .01]; in contrast it made no difference which attention pair was relevant for the low SEL group [t (58 df) = .530, NS]. Performances of the two SEL groups within each attention level were also compared. It was found that upper-middle SEL Ss reached criterion quicker than low SEL Ss (t = 3.493 (56 df), p < .01) when the high attention stimulus pair was relevant. However, when the low attention stimulus pair was relevant, the difference between the two SEL groups was not significant [t = .040 (55 df), NS].

The relationship between the two personality scores and the learning criterion were obtained by Pearson Product Moment correlations. Locus of control as measured by the Bialer scale was not related to the discrimination learning performance for either SEL groups (high SEL, r = .245, NS; low SEL, r = .161, NS). Napp as measured by the CSD instrument was also not related to the learning task (high SEL, r = .018, NS; low SEL, r = -.119, NS).

Split-half reliability coefficients, corrected for length by the Spearman Brown Prophecy Formula, were obtained for the two personality measures. For the CSD, reliability was .916; for locus of control reliability was .496. In view of the low reliability of the locus of control scale, the correlation between IE and learning performance (r = .245) for the upper middle SEL Ss was corrected for attenuation with a resulting r = .350, p < .05.

The means, sd's, and n's of the locus of control and Napp scores for males and females of both SEL's are shown in Table 4. Two 2 x 2 (SEL x sex) factorial analyses of variance for unequal n were computed to test for

TABLE 4

Means and sd's for the IE scale (high score=external)
and the Children's Social Desirability Scale

		upper-middle SEL		low SEL	
		male	female	male	female
		n=23	n=19	n=18	n=12
IE	mean	10.04	8.84	10.22	12.33
	sd	2.20	2.19	2.92	2.14
CSD	mean	19.30	19.26	20.11	29.33
	sd	8.79	10.57	7.59	9.59

significant main effects and interactions. The summaries of these analyses are in Tables 5 and 6.

For the locus of control measure, SEL was clearly a significant main effect [F (1,68) = 10.012, p < .01] with low SEL Ss being more external than upper-middle SEL Ss. Despite the insignificant main effect of sex, the sex by SEL interaction was significant [F (1,68) = 8.157, p < .01].

SEL was a significant main effect for the Napp measure [F (1,68) = 5.999, p < .05], low SEL Ss being higher than upper-middle Ss in Napp. Both sex and the sex by SEL interaction were also significant [F (1,68) = 4.274 and F (1,68) = 4.351 respectively; p < .05 for both].

For both SEL groups on both personality measures, t tests comparing males and females were computed. For the low SEL Ss, girls were more external than boys, t (28 df) = 2.08, p < .05, and higher in Napp t (28 df) = 2.83, p < .01; for the upper-middle SEL Ss the sex differences for both the IE and the CSD scale were not significant.

DISCUSSION

The first hypothesis, that low SEL Ss would take more trials to criterion than upper-middle SEL Ss regardless of the attention level of the training stimulus, was supported only for the high attention dimension. However, the significant F ratio for the main effect of attention level does support the second hypothesis, that training on a cue of a high attention stimulus pair would result in faster learning than training on the low attention stimulus pair.

Of greater interest perhaps, is the significant interaction between SEL and attention level. On close analysis, it was found that this interaction resulted from the highly attended stimulus pair requiring fewer trials to criterion than the low attention pair for the upper-middle SEL Ss only. For

TABLE 5

Summary table for the 2x2 analysis of variance
for the IE data

Source of variance	SS	df	MS	F
A (SEL)	57.3139	1	57.3139	10.012*
B (sex)	3.5218	1	3.5218	0.615
AB	46.6920	1	46.6920	8.157*
Error	389.2606	68	5.7244	

*significant at the .01 level

TABLE 6

Summary table for the 2x2 analysis of variance
for the CSD data

Source of variance	SS	df	MS	F
A (SEL)	503.4401	1	503.4401	5.999*
B (sex)	358.6885	1	358.6885	4.274*
AB	365.1543	1	365.1543	4.351*
Error	5,706.9982	68	83.9264	

*significant at the .05 level

the low SEL Ss the difference was not significant. These results suggest that these low SEL Ss are slow in solving this type of learning task regardless of whether or not the positive training stimulus is of a highly attended dimension. Furthermore, upper-middle SEL Ss are slow in solving this task when the positive training stimulus is one of an unfamiliar (lowly attended) pair.

Recent studies (Suchmann and Trabasso, 1966, and Wolff, 1966) have found learning to be facilitated when training is on the preferred dimension. The results of this present study support these findings for the upper-middle group. However, the results suggest that this difference does not hold for the low SEL group. Overall, the present results do not support previous findings that upper-middle SEL Ss perform better on discrimination tasks than do lower SEL Ss (Covington, 1967, Olson, et al., 1967). Such findings are only supported when the stimulus training cue is on a high attention pair. When training is on the low attention pair, there is no difference in performance between the two SEL groups.

As others have suggested (Zeaman and House, 1963), the present findings again illustrate the necessity of considering attention level as an important variable in discrimination experiments. In the present study, if training had been only on a high attention dimension, conclusions would have been that upper-middle SEL Ss perform better than lower SEL Ss; had training been only on a low attention dimension, the conclusion would have been that there is no difference between the two SEL groups.

The solution of the present task requires the ability to categorize visual stimuli, to sort out and discover which is the relevant stimulus, and to differentiate it from the irrelevant stimuli. The slow performance of the low SEL Ss even when they are trained on a high attention stimulus cue lends support to the idea that low SEL children are deficient in the ability to categorize visual stimuli.

In considering the results of the personality data, hypothesis 3, that internal Ss would perform better on the learning task, was partially supported. It was true only for the upper-middle SEL Ss and then only after correcting the correlation for the attenuating effects of the low reliability on the locus of control instrument. This locus of control-learning relationship must be approached with extreme caution but does seem to warrant further exploration.

Hypothesis 4, that high Napp Ss would learn the discrimination task slower than low Napp Ss, was not supported. It could well be that the year time lag between testing periods accounts for the discrepancy between these results and those of Crowne et al. who did find a relationship.

In regard to hypotheses 5 and 6, low SEL Ss tended to be more external and higher in Napp than the upper-middle SEL Ss. These results seemed to occur because of the high externality and the high Napp scores of the females in the low SEL. It seems clear that these low SEL girls are more prone to answer questions in a socially desirable manner and to see themselves as having less control over what happens to them.

Generally, results of this study indicate that further investigations of the personality correlates of discrimination and conceptual learning are warranted. Moreover, investigation of the effects of attention level on the ease of solving learning problems, especially in regard to SEL comparisons and possible training programs, is also indicated.

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Footnote

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